

An Innovative Approach to the Development of Project Management Processes for Small-scale Projects in a large Engineering Company

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Mini Case Study

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A Canadian division of a large American engineering company has developed and implemented project management processes for their small-scale and medium-scale projects. The company was already using a robust project management process for their large-scale projects. The objectives of this process improvement project were to reduce cost overruns and project delays, standardize practices to facilitate the integration of new managers, increase the level of customer satisfaction and to reduce risk-related planning deviations.

For this improvement project, the engineering organization used the new ISO/IEC 29110 standard developed specifically for very small entities. An analysis of the cost and the benefits of the implementation of small and medium scale project management processes was performed using the ISO economic benefits of standard methodology. The engineering enterprise estimated that, over a three-year timeframe, savings of about 780,000CAD\$ would be realized due to the implementation of project management processes using the ISO/IEC 29110.

The VSE and its Environment

Even though this organization is considered a large enterprise, a large number of projects are within the scope of the ISO/IEC 29110 standards and guides developed specifically for very small entities (VSEs), i.e. enterprises, organizations, departments and projects of up to 25 people.

Starting Point

The company was already using a robust project management process for their large-scale projects. The Canadian division of a

large American engineering company has developed and implemented project management processes for their small-scale and medium-scale projects.

The strong growth of the division in recent years made management aware of the need to improve its methods in order to remain competitive.

Projects in one division, of the engineering enterprise, were classified into three categories according to duration, size, number of disciplines involved and engineering fees. It was decided to classify the engineering projects into three categories: small-, medium- and large-scale projects (see table 1). As illustrated in table 1, over 95% of the projects fall in the smalland medium-scale categories.

	Small project	Medium project	Large project
Duration of project	Less than 2 months	Between 2 and 8 months	More than 8 months
Size of team	Up to 4 people	Between 4 and 8 people	More than 8 people
Number of engineering specialties involved	One	More than one	Many
Engineering fees	Between \$5,000 and \$70,000	Between \$50,000 and \$350,000	Over \$350,000
Percentage of projects	70%	25%	5%

Table 1: Classification of the division's projects (in Canadian Dollar)

<u>The Improvement Project</u>

The objectives of this process improvement project were to reduce cost overruns and project delays, standardize practices to facilitate the integration of new managers, increase the level of customer satisfaction and to reduce risk-related planning deviations.

The goal-problem approach (Potter, 2002) was used to set the improvement program's priorities and to ensure that the goals set by the program addressed tangible problems that the company wished to solve. This approach includes the following steps:

- Determine the business goals (see table 2) and the problems that the company wishes to solve
- Group goals and problems
- Prioritize problems

- Develop and implement an action plan

Table 2.	Division	, c	husiness	goale
1 able 2.	DIVISION	S	ousiness	goals

Description of Objectives			
Facilitate the integration of new project			
managers.			
Achieve a global customer satisfaction level of			
80 %.			
Meet the deadlines and costs planned for the			
projects, within a margin of 5 %.			
Reduce resource overload by 10 %.			
Reduce time delays to one week and cost			
overruns to 5 % of the initial budget.			
Reduce corrective work during the quality			
control phase by 10 %.			
Reduce non-chargeable time for resources by			
10 %.			

Table 3 presents a list of a few problems, ranging from estimation problems to lack of defined practices, that slow down the achievement of the 7 business objectives listed in above.

Table 3: Problems that slow down the
achievement of business objectives

Problem ID	Description			
P-1	Difficulty in integrating new			
11	project managers			
<u>р</u> р	Lack of knowledge of existing			
F-2	tools			
	Difficulty faced by new project			
P-3	managers to understand the ways			
	of doing business of the division			
D /	Projects in difficulty due to poor			
Г-4	time management			
DE	Projects in difficulty due to poor			
r-5	management of resources			

Managers grouped the problems relative to the 7 goals. Finally, they estimated the expected cost and benefit of each objective in order to prioritize them and group them in different implementation phases. Table 4 shows an example of the prioritization of one business objective.

Objective				
	Estimated	Estimated	Priority	
	Benefits	Cost	(Benefits	
	[1-10]	[1-10]	/Cost)	
Facilitate	5	10	0.50	
the				
integration				
of new				
project				
managers.				

Table 4: Example of a prioritization of an objective

There are several frameworks which describes recognized project management practices (e.g. PMBOK® Guide, CMMI®, ISO standards). A set of criteria were selected to determine the most suitable project management framework:

- The framework is suitable for the management of small-scale projects (small team and limited means),
- The company's management knows the framework,
- The framework is recognized by the company's customers,
- Tools are available to facilitate the use of the framework,
- The framework may easily be used and integrated into the existing processes,
- A recognition mechanism through accreditation for the company is available,
- The framework is readily available

The ISO/IEC 29110 was the framework selected for the improvement project.

The project management practices used by the engineering division's project managers were assessed against the ISO/IEC 29110 Basic and Entry profiles by interviewing project managers.

Figure 1 shows the overall results of the assessment of the activities of the PM process of the Basic profile. The figure displays the percentage of the tasks

performed for each of the following activities of the ISO/IEC 29110 management and engineering guide:

- Project planning (15 tasks)
- Project plan execution (6 tasks)
- Project assessment and control (3 tasks)
- Project closure (2 tasks)



Figure 1. Performance assessment of the Basic profile

We note that a low level of implementation of ISO/IEC 29110 activities was achieved, for medium scale projects, within the engineering company at the beginning of the improvement program. Also, during the interview with managers, it was noted the PM tasks were not performed systematically. In addition, the assessment revealed that PM practices varied from project manager to project manager and that no guideline had been defined for a few tasks. A similar assessment, against the Entry profile, was also carried out for the small-scale projects.

<u>Results</u>

The development of processes and tools, such as checklists, templates and forms, was the central element of the solution to the problems identified. An intranet was also developed within the improvement project.

Checklists could provide a useful tool for project managers for the following reasons:

- They are a good way to explain or briefly summarize the tasks to be

performed by the project manager

- They help identify quickly the forms and templates available to perform the project management tasks
- They provide quick links to additional references
- The provide guidance to the project manager for storing the project management documents
- They provide an easy means of assessing the implementation of processes

Pilot projects were carried out to test the solutions developed. Testing the solutions in the context of a real-life project helped verify that the proposed solutions were consistent, achievable and comprehensive. The pilot projects consisted of running three different projects where project managers implemented the process and the associated tools. Managers then evaluated the proposed processes, identified problems and potential improvements. The lessons learned sessions conducted at the end of the pilot projects have identified minor adjustments to the processes and tools.

An analysis of the cost and the benefits of the implementation of small and medium scale project management processes was performed using the ISO economic benefits of standard methodology. Table 5 shows the results for the first three years of the project management process implementation.

Table 5: Anticipated costs and benefits from the improvement program (CAD\$)

	Year 1	Year 2	Year 3	Total
Implementation and maintenance costs	59,600\$	50,100\$	50,100\$	159,800\$
Net benefits	255,500\$	265,000\$	265,000\$	785,500\$

The engineering enterprise estimated that, over a three-year timeframe, savings of

about 780,000 CAD\$ would be realized due to the implementation of project management processes using the ISO/IEC 29110 standard.

Lessons Learned

These lessons were gathered through discussions with members of management and project managers. Potter and Sakry's goal-problem approach helped to prioritize the improvement project and ensure that the goals set by the project were for concrete problems that the company wanted to address. This approach has proven effective in identifying the objectives and project management issues of the company. It has limited the scope of the program so that it can generate results quickly.

ISO/IEC 29110 has developed processes that provide a structured approach for project managers. The actions that the processes require are limited to the most essential to avoid overloading project managers.

The project implementation phases described in ISO/IEC 29110 and the PMBOK[®] Guide are very similar, resulting in a series of three scalable and consistent project management processes.

The tools developed to support the project management processes proved very useful and helped the project managers rapidly integrate the knowledge required to execute the processes.

Plans for the Future

For the first time, the company has documented management processes for small-scale projects. Besides, some project managers have joined forces to promote project management practices within this engineering firm's division. The improvement project was so successful that managers of the company's other divisions have shown an interest in learning this approach in order to implement it within their respective divisions. One division of the enterprise is now planning to review its process for the engineering activities.

Since the utilization of ISO/IEC 29110 was very successful in the development project management processes, the recently published systems engineering ISO/IEC 29110, mainly based on ISO/IEC/IEEE 15288, will be used by the engineering division to redefine and improve its existing engineering process. This process will address the activities required from engineering requirements identification to final product delivery.

References

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Potter, N., Sakry, M., Making Process Improvement Work. Addison-Wesley – Pearson Education, 2002.

More information is available on the following web sites: http://profs.logti.etsmtl.ca/claporte/VSE/index.html